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Sec B

Subject Wastewater Engineering

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Q NO # 01

Wastewater treatment:-

=> Wastewater treatment consist of applying known technology to improve or upgrade the quality of wastewater.

=> Wastewater treatment involves collecting the wastewater in a centralized or decentralized location (wastewater treatment plant) and subjecting the wastewater to various treatment processes.

✱ Importance:-

The principal objective of wastewater treatement is generally to allow human and industrial effluents to be disposed off without causing danger to human health or unacceptable damage to the natural environment.

-> wastewater if properly treated, is an important resource and can be used for various purposes including irrigation, lawn watering, car washing flushing toilets and landscaping etc.

-> wastewater treatment can also generate biogas as final product which is a potential source of energy.

Why rectangular tanks are preferred over circular tanks:-

Rectangular clarifiers typically require less land than circular clarifiers for a similar surface area. The reduction becomes even more significant in a multiple-unit design where common concrete walls are used

between rectangular basins. The resulting land availability is a major advantage for treatment plant layout. Construction cost is also reduced as a result of the common concrete walls.

-> The even flow distribution configuration for rectangular clarifiers requires simpler and less expensive pipe work layout and pumping requirement as compared to circular clarifiers where the pipes require a more complicated layout pattern and perhaps a separate pumping station, as well.

purpose of using a rectangular sedimentation tank:.

1) Easy to operate and low maintenance costs.

2) Easy adaptation to high-rate settlers and tolerant to shock loads.

(3) Commonly used in muncipale and industrial applications.

(4) Suited to large capacity plant.

QNO #02:.

Aerobic wastewater treatment:-

-> Aerobic processes use bacteria that require oxygen, so air is circulated throughout the treatment tank.

-> These aerobic bacteria then break down the waste within the wastewater.

-> Some systems utilize a pretreatment stage prior to the main treatement to reduce the chance of clogging the system.

-> Electricity is required for system operation.

Anaerobic wastewater treatement:-

-> Anaerobic bacteria transform organic matter in the wastewater in to biogas that contains large amounts of methane gas and carbon dioxide.

-> Energy-efficient process

-> often used to treat industrial wastewater that contains high levels of organic matter in warm temperatures

-> It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

Activated Sludge Process:-

-> The sludge blanket is measured from the bottom of the clarifier.

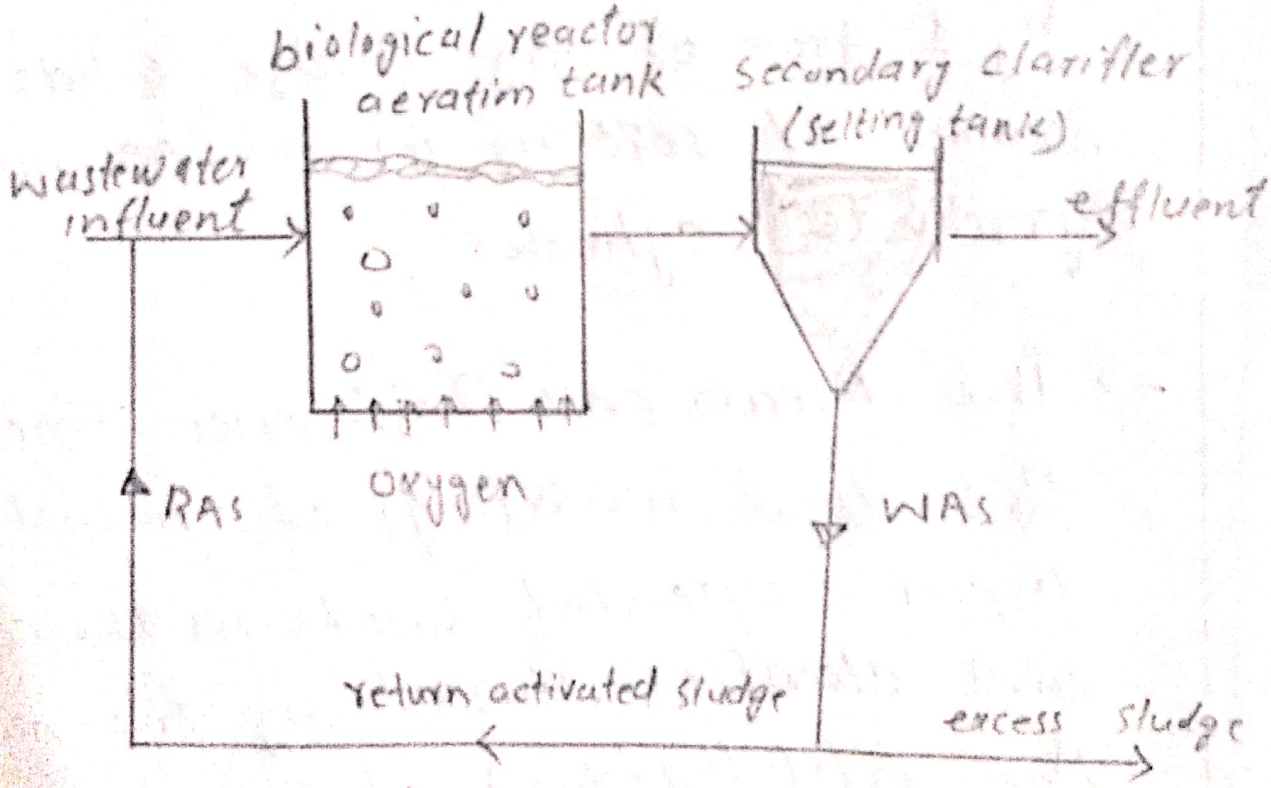
-> The sludge volume Index is the volume of settled in a mm occupied by 1 gram of dry sludge solids after 30 mins of settling in a 1000 ml graduated cylinder.

-> The Mean cell Residence Time is the total mass (kg) of mixed liquor suspended solids in the aerator and clarifier divided by the mass flow rate (kg/day) of MLSS effluent.

-> The F/M is amount of BOD fed to the aerator (kg/day) divided by the amount of MLVSS (kg) under aeration.

-> Some use Mixed Liquor Suspended Solids for expedience but

Mixed Liquor volatile suspended Solids is Considered more accurate for the measure of microorganisms



QNo = 03

Assimilative Capacity of Receiving Bodies:.

=> Assimilative capacity of receiving water bodies refers to the ability of a body of water to cleanse itself; its capacity to receive wastewaters without deleterious effects and without causing damage to aquatic life or humans who consume the water. It is level to which water body or nature control the toxicity without affecting the aquatic life.

=> Although wastewater is properly treated before it is disposed of to the natural water streams still it has impurities /

pollutants that need to removed or make them less effective so that the receiving water bodies may not become unsuitable for use or cause damage to the aquatic life.

Help of Assimilative capacity in wastewater treatment:.

The assimilative capacity help in wastewater treatment in the following aspects.

1) Dilution:.

In this dilution occurs which is a process in which the concentration of pollutants are receving water, usually simply by mixing with more quantity of water.

2) Dispersion:.

Dispersion is the distribution of pollutants in relatively large area of water. Dilution and dispersion are inter-related.

3):. Sunlight:.

Another importance of Assimalative treatment is sunlight which facilitates biological decomposition of pollutants and kills pathogens by ultraviolet radiation (UV).

(4) Temperature..

In temperature capacity the temprature play in important role in assimilative capacity of capacity of reciving water.

increase in temperature will increase the biological decomposition of organics and thus assimilative capacity will improve. Increase in temperature also causes to increase the dilution process and thus increase the assimilative capacity.

5) Flow velocity:-

Assimalative capacity of reciving water, also helps in terms of flow relaity. Higher the flow velocity will encourage quick dilutions and dispersion of pollutants.

(6) Depth of Flowing water:-

Assimalative capacity is directly related to the Depth of receving water bodies. Increase in depth relates UV radiation & in turns Pathogens are killed.

Q NO # 04

Sludge management:.

Sludge refers to the residual, semi-solid material left from, muncipal wastewater or industrial wastewater treatement processes Substainable sludge handling/managing may be defined as a socially acceptable, cost-effective method that meets the requirement of efficient recycling of resources while ensuring that harmful substances are not transferred to humans or the environment i.e water air or soil.

Advantages of sludge handling/ managing in wastewater engineering:

1.) As wastewater engineering is directly related to environment sludge management is approach towards a better environment

2.) Residual wastes from hospitals, research facilities and other industries can be hazardous to our health and the environment. These harmful elements may require thermal treatments to control the spread of diseases or toxins. Sewage sludge incineration reduce volume (up to 90%) and weight (up to 75%) and breaks down dangerous substances such as pathogens and toxic chemicals. Flue gases from exhaust pipes must be handled properly by utilizing a

a complex treatment system to prevent hazardous emissions and ashes from contaminating the environment.

3). Due to excess of new problems in sludge management every year new techniques and professional/experts are emerges in waste water engineering industry to face the challenges and finding the solutions.

Q NO: 05

Environmental Impact Assessment (EIA):

A technique and a process by which information about environmental effects of a project is collected both by the developer and from other sources, and taken into account by the judgement on whether the development should proceed.

Parameter So Be consider;.

Environmental Damages should be minimum such as do not affect water body greeney and energy consumption which effect the

the enviroment should be controlled Enviromental Benefits should be maximum and water life should be protected.

Ensures the Development is according to:

National Quality Standards (NEQs)

The projed should ~~be~~ not conflice with Govt. policies.

Indernational obligations should be strictly followed.

Most treatment plants have primary treatment (physical removal of floatable and settle able solids) and secondary treatment (the biological removal of dissolved solids). Some other treatment plants have certiary

treatment option. The purpose of tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharge to the receiving environment (sea, river, lake ground etc) More than one treatment process may be used at any treatment plant.